AMENDMENT

IN THE CLAIMS

Please amend claim 1 as indicated in Appendix A submitted herewith according to the proposed revision to 37 C.F.R. §1.121 concerning a manner for making claim amendments.

REMARKS

Claims 1-4 are presently pending in the captioned application with claim 1 being amended.

Claim 1 has been amended to recite a "molded" catalyst. Support for the limitation can be found in Example 1 at page 9, lines 28-31 and at page 7, lines 1-6 of the specification. No new matter within the meaning of §132 has been added by the amendment.

Accordingly, Applicant respectfully requests the Examiner to enter the claim amendments and to reconsider and allow all claims pending in this application.

1. Rejection of Claims 1-4 under 35 U.S.C. §103(a)

The Office Action rejects claims 1-4 under 35 U.S.C. §103(a) as being unpatentable over WO 98/24746, which is equivalent to US 6,028,220 ("Wada et al."). The Office Action states:

> Wada et al. discloses a process for the preparation of acrolein and acrylic acid by carrying out the vapor phase catalytic oxidation of propylene with molecular oxygen or a gas containing molecular oxygen using a fixed bed multi-tubular reactor (see col. 1, lines 8-13). Furthermore, the reaction process for the production of acrolein and acrylic acid can be performed by introducing a mixture gas consisting of 1 to 10% by volume of propylene as the starting material (see col. 8, lines 26-29).
>
> In the process, a plurality of oxidation catalysts having a composition of the following is employed: $Mo_aBi_bNi_cCO_dFe_fY_gZ_hO_x$ where Mo, Bi, Ni, Co, and Fe represent molybdenum, bismuth, nickel, cobalt and iron, respectively; Y is at least one element selected from the group of tin, tungsten, manganese, magnesium, antimony and titanium; Z is at least one element selected from the group of potassium, rubidium, thallium, and cesium; a, b, c, d, f, g, h, and x represent the number of atoms of molybdenum, bismuth, nickel, cobalt, iron, Y, Z, and oxygen; a=12, b=0.1 to 7, c+d=0.5 to 20, f=0.5 to 8, g=0 to 2, h=0 to 1 and x is determined by the oxidized condition of each element (see col. 4, lines 13-29) in U.S. 6,028,220.

Applicant traverses the rejection because Wada et al. does not teach each and every claimed limitation of amended claim 1. In particular, Wada et al. fails to disclose a **molded** catalyst

as well as the specifically claimed limitations regarding occupying volume, calcining temperature and type of alkali metal element.

As the Federal Circuit ruled, a *prima facie* case of obviousness must establish: (1) some suggestion or motivation to modify the references; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

However, even if a *prima facie* case of obviousness has been established, secondary considerations such as commercial success, long felt but unsolved need, failure of others, and unexpected results may nevertheless give rise to a patentable invention. Graham v. John Deere Co., 148 U.S.P.Q. 459 (1966). For example, evidence such as superiority in a property the compound shares with the prior art can rebut a *prima facie* case of obviousness. See In re Chupp, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987).

In the present application, amended claim 1 recites a process for producing acrolein and acrylic acid, comprising **molded** catalysts which are formed of complex oxides of the

composition expressed by a general formula (1):

$$Mo_aW_bBi_cFe_dA_eB_fC_gD_hE_iO_x \quad (1)$$

wherein the plural kinds of catalysts are different from each other in

(α) occupying volume, and

(β) calcining temperature and/or

(γ) kind and/or amount of the alkali metal element,

wherein the occupying volume (α) is prepared by varying the dimensions of the molded catalyst particles in a range of 3-15mm,

the calcining temperature (β) is in a range of 300-650°C,

the alkali metal element (γ) is prepared by varying the atomic number g in the general formula (I) within the range of 0.001-3, and

by dividing the catalyst layer in each of the reaction tubes into at least two layers in the axial direction of the tube, sequentially with said plural kinds of molded catalysts in such a manner that the catalytic activity increases from the starting gas inlet side toward the outlet side.

Wada et al., on the other hand, fails to teach an unsupported, molded catalyst. Instead, Wada et al. only teaches

supported catalysts. In particular, Wada et al. requires that the catalytically active components be supported on a carrier and then mixed with a molding additive. See Wada et al. at col. 5, line 59-60. Moreover, Wada et al. specifically forecloses any unsupported catalysts by stating that the oxidation catalyst is "to be supported on a carrier". See id. at col. 5, line 4.

Other indications of such precisely tailored teachings include further teachings in Wada et al. that the size of the supported catalyst is dependent on the size of the carrier, the supporting amount and other carrier-dependent factors. See id. at col. 7, line 53-55. Even claim 1 of Wada et al. requires in paragraph (a) that the plurality of catalysts be supported on a carrier. Clearly, a carrier is critical to the catalysts of Wada et al. The same cannot be said for the presently claimed invention.

At this time, Applicants would like to point out that one of ordinary skill in the art would know that that unsupported catalysts are the "molded" catalyst of presently pending claim 1, which are prepared according to the disclosure at page 7, lines 1-6 of the specification.

Retuning to the *prima facie* case, Applicants would also like to note that Wada et al. fails to teach or suggest the

synergistic combination of the claimed limitations for the presently claimed catalysts. In particular, Wada et al. fails to teach an unsupported, molded catalyst having: (a) particular occupying volume with the catalysts in a range of 3-15mm, (b) kind and/or amount of the alkali metal(s) prepared by varying the atomic number g in the general formula (I) within the range of 0.001-3 and (c) calcining temperature of the molded catalyst in a range of 300-650°C. In combination, the presently claimed limitations go far beyond simple experimentation and impart patentable distinctions over the processes taught by Wada et al.

Although the Office Action alleges that occupying volumes is a results-effective variable, one of ordinary skill in the art would not have known that the synergistic combination of occupying volume, kind and/or amount of the alkali metal(s) and calcining temperature for a molded and unsupported catalyst would result in unexpectedly improved properties. In other words, the cited reference fails to teach that optimization of occupying volumes, alkali metals and calcining temperature in conjunction and synergistically would have given rise to remarkably reduced formation of heat spots. See In re Antoine, 195 UPSQ 6 (C.C.P.A. 1977).

Clearly, a *prima facie* case of obviousness has not been

established because each and every claimed limitation has not been taught by the cited reference.

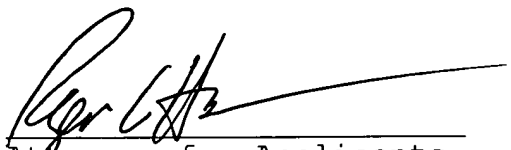
Accordingly, Applicant respectfully submits that the presently claimed invention is not obvious over Wada et al. and respectfully request the Examiner to reconsider and withdraw the 103(a) rejection of claims 1-4.

CONCLUSION

In light of the foregoing, Applicant submits that the application is now in condition for allowance. The Examiner is therefore respectfully requested to reconsider and withdraw the rejection of the pending claims and allow the pending claims. Favorable action with an early allowance of the claims pending is earnestly solicited.

Respectfully submitted,

SHERMAN AND SHALLOWAY



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Attorney Docket No. S-2489
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	Group Art Unit: 1625
TANIMOTO	)	Examiner: OH, TAYLOR V.
Serial No. 09/778,747	)	
Filed: February 08, 2001	)	

For: **PROCESS FOR PRODUCING ACROLEIN AND ACRYLIC ACID**

Appendix A

Please amend the claims according to the proposed revision to 37 C.F.R. §1.121 concerning a manner for making claim amendments.

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1. (Currently Amended) A process for producing acrolein and acrylic acid through vapor phase catalytic oxidation of propylene with molecular oxygen or molecular oxygen-containing gas using a fixed bed shell-and-tube reactor, which comprises preparing plural kinds of molded catalysts which are formed of complex oxides of the composition expressed by a general formula (1):

$$Mo_aW_bBi_cFe_dA_eB_fC_gD_hE_iO_x \qquad (1)$$

(wherein Mo is molybdenum; W is tungsten; Bi is bismuth; Fe is iron; A is at least an element selected from cobalt and nickel; B is at least an element selected from phosphorus,

tellurium, arsenic, boron, antimony, tin, cerium, niobium, lead, chromium, manganese and zinc; C is at least an element selected from alkali metal elements; D is at least an element selected from alkaline earth metal elements; E is at least an element selected from silicon, aluminum, titanium and zirconium; and O is oxygen; a, b, c, d, e, f, g, h, i and x denote the atomic numbers of Mo, W, Bi, Fe, A, B, C, D, E and O, respectively, and where a is 12, b is 0-5, c is 0.1-10, d is 0.1-10, e is 1-20, f is 0-5, g is 0.001-3, h is 0-3, ∓ i is 0-30, and x is a numerical value which is determined depending on the extent of oxidation of each of the elements)

C1 Cont

and which are different from each other in

(α) occupying volume, and

(β) calcining temperature and/or

(γ) kind and/or amount of the alkali metal element,

the molded catalysts which are different from each other in occupying volume (α) being prepared by varying the dimensions of catalyst particles within the range of 3-15 mm,

the molded catalysts which are different from each other in calcining temperature being prepared by varying

the final calcining temperature (β) within the range of 300-650°C, and

the molded catalysts which are different from each other in amount of the alkali metal element (γ) being prepared by varying the atomic number g in the general formula (I) within the range of 0.001-3, and

filling the reaction zones provided by dividing the catalyst layer in each of the reaction tubes in the fixed bed shell-and-tube reactor into at least two layers in the axial direction of the tube, sequentially with said plural kinds of molded catalysts in such a manner that the catalytic activity increases from the starting gas inlet side toward the outlet side.

C1 Cont

2. (Original) A process according to Claim 1, in which the number of reaction zones is 2 or 3.

3. (Previously amended) A process according to Claim 1, in which a starting gas whose propylene concentration is at least 9 volume % is introduced.

C1 Cont

4. (Previously added) A process according to Claim 2, in which a starting gas whose propylene concentration is at least 9 volume % is introduced.